THE CAROLINA CHEMIST

Published twice each year by the Department of Chemistry of the University of North Carolina, Chapel Hill, N. C.

Vol. 5 DECEMBER, 1919 No. 2

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Chemists, Complete Your Education

I. V. GILES

In these days of transition from war to peace time basis when in the industrial, financial and commercial world everything is in a state of previously unequaled unrest, there often comes to the mind of the professional man and the man preparing himself for a professional career, the idea that an education is unnecessary. The question arises, "Why secure a professional education when one can earn more at a laboring job than the average professional man earns immediately after finishing his education?" This condition causes some of the nearsighted to consider giving up their partly-completed training in chemistry, or whatever their chosen profession may be, and seek immediate employment at some high-priced wage-earning trade.

There are several reasons why the chemistry student should give this matter very careful consideration before giving up a present opportunity of finishing his education. In the first place the struggle cannot continue very long as is now going on between capital and labor. With readjustment of affairs the

price of labor compared to that of the "insignificant" salaried man will be changed enormously. The high price of labor and the high cost of living naturally go along at an equal pace. In a short while in the industrial world the shortage of domestic needs, which were brought about by our factories turning over to war work, will be relieved. Then there will be an excess of labor in the country which will make the laboring man willing to work for less money. This in turn will lower the high cost of living slightly. By a series of gradual steps like this, things will gradually come back to normal.

But there is going to be an increasing demand for chemists. The need of highly expert trained chemists is becoming more evident to the manufacturer every day. The war has taught us that we must not and will not be dependent on any other nation for the daily necessities made by chemical processes. The ability of the chemists of the allies was as important a factor toward winning the war as the strength of their man power. Similarly the importance of the chemist is going to be realized just as much in competitive manufacturing for normal times.

In previous years the laboratory in connection with a plant was often considered a sort of necessary evil. Nothing was produced there which directly augmented the income of the plant. When a visitor was being shown through the plant the laboratory would be avoided by the guide because he considered it an obsolete place which did not interest him and would not interest the stranger. But only recently the farsighted manufacturer has realized the importance of the laboratory. A great number of the manufacturing establishments which involve chemical processes in their operations have adopted the system of chemical control, and have, besides the operating laboratory, a research laboratory. This laboratory is praised as a place where operations can be studied, processes can be improved, and yields increased. And now if they fail to show a stranger through the laboratory it is not because they think it isn't worth while, but because some process is being studied that is considered so important that it is kept secret.

Some have made the above step and others will follow. The demand for chemists in the future will be an increasing one instead of a diminishing one. But the manufacturer is going

to demand well-trained chemists. For his operating laboratory, under the direction of one chief with executive ability, a corps of analysts trained in night schools or correspondence schools, who call themselves chemists, can successfully carry out the routine work. But for the research laboratories and the plant engineering operations he is going to demand a real chemist or chemical engineer.

The student who wishes to be more than an ordinary analyst all his life should complete his education while he has the opportunity. The above partly-trained chemist reaches his highest attainment when he becomes foreman of an operating laboratory. The goal of the trained man is unlimited. Now is the opportunity. Get all the education you possibly can and you'll never regret it.

Chemical Industries in North Carolina

We are indeed proud of the fact that North Carolina is so generously following the tendency of the times in building up a great variety of essential chemical industries. We seem to be realizing the fact that we can not be economically independent unless we manufacture our raw materials into useful articles at home. Evidence of this conviction is shown by the fact that we now have 146 chemical plants in the State. (This number does not include cotton mills which do their own dyeing, and furniture factories, etc.) These plants are divided among sixteen industries which produce the following classes of goods: drugs and patent medicines; cotton seed products; fertilizers and sulfuric acid; fish oil and fertilizer materials; leather; mercerized cotton cloth; paper pulp; rubber tires; soap; dyes; breakfast foods; lime; tanning extract; and sizing compounds.

It is interesting to note the geographical distribution of these industries. The cotton oil and fertilizers industries are found in the eastern half of the State largely, while the paper pulp and tanning industries are almost entirely in the west. The fish oil production is confined to the region of the coasts and sounds. The drug and patent medicine industry, however,

extends all the way from Wilmington to Asheville with no special preference for any section.

The cotton seed oil industry is by far the most important chemical industry in North Carolina. It embraces forty-nine plants with an investment of over twenty-two million dollars. It is one of the youngest of all the great industries of the South, but its products are of prime importance. For example, refined cotton seed oil is a valuable article of food, marketed as Cottolene, Oleomargarine, etc. The meal from cotton seed oil is valuable for feed for animals, and also for fertilizer. The hulls are also used for feed. The by-product obtained in refining cotton seed oil known as "foots" is used in making soap.

The fertilizer industry ranks next in importance. There are twenty-seven fertilizer factories in the State, besides certain cotton oil mills and fish scrap plants which make fertilizer. Phosphate rock is the most important raw material used in these plants. It is treated with sulfuric acid in order to make it soluble in water and hence it is known as acid phosphate.

Tanning has developed into an important industry in western North Carolina. The plants have been placed there largely because of the abundance and cheapness of tanning materials and the relatively short haul from the coal fields. There are now thirty plants producing leather. Belting and sole leather are their chief products. Very little "upper" leather is now made in the State. The tanneries are leaders in the adoption of expert chemical control instead of the hit or miss "rules of thumb" formerly used.

The fish scrap industry consists of six plants operating in the extreme eastern half of the State with Beaufort as the center of the industry. They produce large quantities of fertilizer materials, and oils which are used largely in certain other manufacturing processes.

The manufacture of drugs and patent medicines is a rising industry in North Carolina. There are now eighteen factories turning out these products. Many of them are quite well known. The manufacture of rubber tires, paper pulp, mercerized cotton cloth, soap, etc., is in the early stage of its development. These industries are represented by only one or

two plants each at present, but there is every evidence that they will be enlarged soon, since raw materials are abundant and are not more expensive than they are elsewhere. There are sufficient markets for the products also.

Should We Have Such a Committee?

H. M. TAYLOR

Advancement and general progress seem to be the slogan now and Carolina is keeping pace with the times. But even with its additions to the faculty, enlarged library, new physical laboratory, and other general improvements, there is one thing that has been overlooked; and which you, alumni, can help to put on a sound basis. With the addition of this improvement in our system, not only would Carolina men, but also the department be greatly benefited. A department is known to the commercial world and has its reputation made by the men that it turns out and by the positions that they are holding. Now no one denies that Carolina turns out good men, but are they holding the positions that they should hold?

Maybe you have guessed what my idea is; or perhaps you are merely curious. If only curious then I hope that your curiosity will not die, but that upon learning my idea, it will be supplanted by a desire to see how it will work out.

What I propose is a committee, composed of alumni with the head of the department or one of the faculty as chairman, whose duties would be to keep in touch with the commercial world and the positions that are available. Every graduate should be placed in a good position when he leaves college; nor should he be forgotten when that is done but follow him, and when a position better than the one which he is holding becomes available aid him to secure it. In this way Carolina men would soon be on top and their records would become a recommendation for the department as well for themselves. Can you not see the advantage of such a system?

The idea may be only Utopian but it sounds very good on paper and should work out in practice. Think it over and let us know what you think of it.

Chemists or Engineers?

T. M. ANDREWS

The following is submitted not as a criticism but with the hope that it will receive the constructive thought of every Carolina chemist. Continued agitation has brought about to a large extent a more systematic control of our chemical industries. Not only is this true in regard to laboratory control, but in all of the industrial establishments, we find the processes in charge of trained chemical engineers.

With a review of our chemical directory, it is found that comparatively few Carolina men are engaged in plant operations. Most of them are either teachers, analytical or research chemists. Is this a matter of preference or does it mean that these men are not willing to undertake and do not have the opportunity to get out of the laboratory into plant work? The field is certainly large and growing, the work quite agreeable and the positions attractive financially. Often it offers better openings to positions of responsibility and administration.

The one remedy for this situation is the broadening of our engineering course. At present it is only natural to find our men holding positions that their training and experience best fits them to hold. Of course this does not mean that a man may not expand his training and get into the manufacturing side, but the majority usually stay where they begin. It would seem to be a wise plan to give two degrees, namely, Bachelor of Science in Chemistry and Bachelor of Science in Chemical Engineering. This will enable a man to choose his course and specialize as he desires. Our men can then the more easily secure engineering positions and not be placed to a disadvantage as is often the case at present. Not only will this be a great aid in advancing our men, but it will also give our growing department an additional field for placing its graduates.

Give the Young Chemists a Square Deal

In order for a chemist to do his laboratory work effectively he must have plenty of elbow room. It is also safer for his neighbors, for sometimes a test tube extends its activities (both chemical and physical) over a considerable radius. Such

activities tend to disconcert neighboring workers too. But all this is merely preliminary to saying that our embryonic chemical engineers are rather seriously handicapped for lack of space in their first "researches" in the preparation of oxygen and hydrogen, etc., on account of the fact that they have to do their laboratory work alongside of 250 other students who are taking chemistry for "culture," "credit," or as a "pud," or for any other reasons whatsoever,—or for lack of reasons. And besides this, special apparatus for more detailed experimentation by so large a crowd is prohibited by its cost, but no one will deny that a freshman chemist should do a greater variety of experiments than the present equipment provides for. But even if the needed equipment could be obtained, the average A. B. man would not care to give more time to the laboratory than is now required. Therefore, we contend that a special laboratory providing plenty of room, a sufficient assortment of apparatus, and a more comprehensive selection of experiments, should be provided for the benefit of those students who are beginning chemistry as a profession.

A New Chemistry Building, 1920?

For the first time since the present chemistry building has been erected, we have found it impossible to provide laboratory space for all of the students who have applied for courses in chemistry this fall. In qualitative analysis sixteen men were put on the waiting list for this reason. In organic chemistry ten were transferred to a laboratory in the medical building, and five others were finally dropped from the course on account of lack of space. We will have still larger numbers of men applying for this course in the future because it has been made a requirement in the medical school. The senior and research laboratories are also full, and with the present arrangements we can accommodate only sixty more than we now have in the general chemistry laboratory. This number is expected next year.

We do not wish to pose as prophets but it is impossible for us not to feel that in the near future a new chemistry building will be an absolutely compelling necessity. There are more men

in the University now than ever before, and more of them are taking chemistry than at any previous date. We do not expect this number to decrease. We do expect it to increase, however, and since the capacity of the building is taxed with the present number of students, we feel that there is ample justification for prophecy.

Undeveloped Resources

STROUD JORDAN

It is a deplorable fact that so many natural resources are overlooked and that when discovered it is next to impossible to get them marketed. This is not due to a lack of purchasers but to the refusal of producers to attack new problems. The only efficient method appears to be individual and this requires a backing of capital which it is not easy to obtain on new ventures. I am not going to suggest any method for overcoming this difficulty but intend to point out some of these undeveloped resources which will be profitable and for which a ready market exists.

Sweet Gum (Liquidamber Styraciflua)

This is a cinnamic balsam carrying about 35 per cent of total cinnamic acid, varying amounts of cinnamyl alcohol and esters, as well as other materials for perfumes and extract manufacturers. A ready market exists for quantities of this material.

The bark from the lumber industry, which is available in quantities, carries about 4.00 per cent of oxalic acid as calcium oxalate which may be separated by levigation, tannic acid and a reddish brown coloring matter insoluble in water which may be used as a basis for vegetable dyes.

The leaves and green twigs from this tree carry a large percentage of tannin which dyes beautiful shades of brown, black and yellow. This color may be varied like the rainbow when proper mordants are used. A certain percent of glucose is always present for some of the dye is present as a glucoside.

Locust Beans (Honey Pods)

Carry large percentage of sugars and are valuable in food and extract manufacture, also a source of industrial alcohol.

The seeds from this material find a ready market in the manufacture of "tragacol" an artificial gum tragacanth.

Jerusalem Artichokes

Carry large percentage of inulin and some starch. Easily converted into levulose syrup. Ready market for this material and the source of supply is almost inexhaustible.

Life Everlasting (Rabbit Tobacco)

Yields a volatile oil on steam distillation which has not been investigated chemically, but which will find a ready market in catarrhal and asthmatic preparations. Leaves also carry a varying proportion of tannin.

Recent Research by the Department

T. M. ANDREWS

With the advent of world peace comes a return of world competition in the chemical industries. During the two years just past the American chemists by untiring efforts demonstrated their ability in the field of research and it is to be hoped that this will be but a beginning of what may be accomplished. Chemistry and chemical research have met with popular favor among all classes. This was well demonstrated by a set of resolutions adopted by the American Federation of Labor indorsing a policy of investigation and research. During the past year valuable research has been carried on by the department and much additional work is now being done by both faculty and students.

The department is coöperating with the Federal government in two lines:

(1) The National Research Council through its Division of Chemistry has asked for coöperation in the study of the melting points and other thermal properties of the nitrotoluenes. The first two articles regarding this investigation have just appeared in the November number of the Journal of Industrial and Engineering Chemistry. In the first of these articles, J. M. Bell and J. P. Sawyer gave the melting points of mixtures of trinitroxylene (was being considered as a shell ex-

plosive), and nitrotoluene. In the second Dr. Bell and E. O. Cummings gave the refractive indeces of mixtures of three of the nitrotoluenes. The work is being continued this year by Messrs. Spry, White and Cordon, who are including orthonitrotoluene in the study. As this compound melts at about —10° C., they are anticipating some interesting troubles when they work on the mixtures, some of which will melt much lower than this.

(2) The Bureau of Soils of the Department of Agriculture is investigating the commercial possibilities of kelp and has met with signal success. Although potash and iodine are not obtained in sufficient quantity to make the industry "go," a by-product, charcoal, with wonderful absorbent properties makes the industry a commercial success. One of the by-products is kelp oil, whose constituents are yet to be determined. This oil has great possibilities and the results from its study are awaited with eager anticipation. The Bureau of Soils has enlisted the coöperation of Dr. A. S. Wheeler in this research and the work will be carried out in the laboratory here.

Dr. F. P. Venable has been unable to continue his research work here due to his duties as head of the department and work during the war as a member of the General Advisory Board for the Bureau of Mines and the Advisory Board for Chemical Warfare Service. However, under his direction several articles from the department have appeared in the journals during the past year and others are to go into print at an early date.

I. W. Smithey and I. V. Giles have undertaken studies with cymene, which they are obtaining from spruce turpentine. By nitration it is converted into mononitrocymene, and then by reduction into aminocymene which corresponds to aniline in the benzene group. Aminocymene will in reality constitute the starting point in the research work, though they have already found stumbling-blocks in reaching this point. Dr. Wheeler is in charge.

T. M. Andrews, under the direction of Dr. Wheeler, has taken up the study of the constitution of tribromjuglon and certain derivatives. The work begins with naphthalene which is sulfonated. The resulting sulfonic acid is fused with caustic

soda to prepare dihydroxynaphthalene which is then oxidized to juglone.

H. M. Taylor is making a study of the solubility of benzoic, anthranilic, cinnamic, phthalic, citric, picric, salicylic, and succinic acids in cymene. This is undertaken as an additional investigation of the properties of cymene and is being done under the direction of Dr. Wheeler.

R. H. Souther is looking into the action of alcoholic potash upon Schiff's bases made by condensing chloral with various aminobenzoic acids.

D. H. Jackson is continuing the study of zirconium under Dr. Venable. The purpose of this investigation is to determine the effect of concentration and temperature on the rate of hydrolysis of zirconium sulfate and zirconium chloride.

S. C. Smith has begun to solve a puzzle in the reaction of chloral upon metanitraniline. This reaction yields three derivatives, whereas all similar reactions yield only two, namely, an addition or condensation product according to the method of procedure. Dr. Wheeler is in charge of this investigation.

M. C. Yoder, under Dr. Venable, is working on a series of double chromates of ammonium-calcium, ammonium-strontium, and ammonium-barium similar to the corresponding double chromates of potassium.

Departmental Notes

L. M. NELSON

Many valuable improvements and extensions are being added to the chemistry department this year. On account of the great increase in the number of students taking chemical courses, extension in all the laboratories was necessary. Three hundred students are taking general chemistry, making it necessary to greatly increase the apparatus and working space in the laboratories for this course. Two instructors have recently been added to the department and the number of assistants has been doubled. The large increase each year in the number of first year men taking chemical engineering speaks very favorably for our chemistry department.

The chemistry building is being rewired by the most modern electrical methods, and over sixty electrical heaters are being installed, one or more in each laboratory. Very delicate balances and a microscope have been ordered and will soon be installed. New desks with reinforced cement tops and several new pieces of apparatus for the physical chemistry laboratory have been added. Since physical chemistry is such an important branch of this science, these recent improvements in this laboratory have long been needed, and will add greatly to the efficiency of the department. A well-equipped laboratory for industrial chemistry is being planned, and will be installed before the end of the year. Several journals, which were held up during the war by the blockade, have been received for the library, and a Swiss journal has also been added to our unsurpassed and valuable library. In every laboratory additional apparatus has been added in order to meet the large increase in the number of students taking chemistry, and the future prospects for the expansion of our department are indeed very bright.

Dr. Bell motored to New York to attend the recent meeting of the American Chemical Society. About twenty miles from Lynchburg he broke a rod in his engine, which accident was caused by the very bad roads in that wild, mountainous district. Dr. Bell was very fortunate and also surprised in being able to find a well-equipped Ford supply and repair shop, run by four "Moonshiny" looking mountaineers. The shop was situated in an ideal place for making moonshine whiskey, about two miles from the road. He said that since three of these men worked on his car for over three hours and charged him only two dollars for the entire job, they must have had connected with their Ford shop, the more profitable business of making moonshine, or else they hadn't heard of the present-day high prices. Not considering his engine trouble he had a very pleasant journey.

Alpha Chi Sigma

H. M. TAYLOR

The present collegiate year opened brightly for Rho chapter of Alpha Chi Sigma and the prospects of a very successful year appear good. At the opening of college there were eight

members: E. B. Cordon, S. C. Ogburn, Jr., L. M. Nelson, T. P. Dawson, D. M. Carroll, C. R. Harris, T. M. Andrews, and H. M. Taylor. T. M. Andrews has been absent for two years with the du Pont Company and returns to chase the elusive Ph.D. C. R. Harris has been aspiring to an "ace" in the air service and returns with a Reserve commission. H. M. Taylor spent last year at Pennsylvania State College drilling S. A. T. C. students in the fall and as a student in the spring. Initiation was conferred upon I. V. Giles, F. H. Spry, and R. H. Souther, thus bringing our membership up to eleven. With so many old men back we expect to accomplish great things.

We have opened our chapter house again and are at home to all Carolina chemists and to Alpha Chi Sigma men in particular. When may we expect a visit from you?

Chem. Feed

R. H. SOUTHER

In accordance with our ancient custom, that most enjoyable and perhaps the biggest event of the season, to the first year men, the annual Chem. Feed was held in the basement of the chemistry building, Friday evening, November 14th. The unusually large crowd which gathered around the festive board this year is indicative of the increasing popularity of our first real get-together meeting.

Presiding as toastmaster, Dr. Wheeler very cleverly introduced the speakers for the occasion. Dr. Venable, who was first on the program, talked briefly on the expansion of the department and the necessity of enlarging the present building in the near future. Dr. Bell, who some time ago appointed himself librarian, discussed the value and use of our library, stating that it rated with those of the larger universities such as Cornell and Harvard.

The autocrats of Chem. 1 laboratory were next heard from, and Mr. Smithey explained the work and scope of THE CAROLINA CHEMIST, the new High School Department feature, and introduced the plan to award a medal to the High School student making the highest grade on a competitive examination

in chemistry. Mr. Giles then read us a few of those brilliant abstracts from chemistry I quizzes. This bit of refreshing knowledge was followed by short talks from the graduates and seniors.

An added feature of the Chem. Feed this year was the presence of our chemical engineering co-ed, Miss Verner, of Panama, who told us about her great interest in chemistry and expressed the desire that she be considered as "one of the boys."

After these interesting talks, the remainder of the evening was delightfully spent in enjoying the abundant spread of eats and punch. Pronouncing the affair a decided success, and wearing the smile of satisfaction that follows every Chem. Feed, the B. S. I. men, and lady, reluctantly adjourned until next year.

Personal Notes

R. H. SOUTHER

During the summer I. W. Smithey, who was this year made instructor in chemistry, did research work on terpentine for the Bureau of Chemistry, being located in Washington, D. C. It will be recalled that Mr. Smithey was engaged in investigating naval stores during the summer of '18.

I. V. Giles, who left after receiving his B. S. degree in '18, to accept a position with the E. I. du Pont Co. at Arlington, N. J., has returned to us again as an instructor in chemistry. While at Arlington, Mr. Giles was engaged in research work in the Delta laboratory.

We are pleased to welcome the return of T. M. Andrews to our midst. After receiving his M. A. in '17, Mr. Andrews obtained a position with The United States Steel Corporation, Birmingham, Ala., but later accepted one with the E. I. du Pont Co., at Wilmington, Del. Last summer was spent, however, in touring California and the West.

H. M. Taylor, '20, who took a year's leave of absence to supervise S. A. T. C. affairs, and incidentally to study chemistry at Penn. State, is back again with his first love. Mr. Taylor cites many interesting experiences in his military career, but there's no place like Carolina for studying chemistry, he says.

Two new men have been added to the graduate roll this year, J. I. Holland, who comes to us with an M. A. degree from Wofford, and M. C. Yoder, who hails from Lenoir College, where he received an A. B. degree in '17. Mr. Holland enlisted during the early period of the war, and was indefinitely furloughed to the Hercules Powder Co., at Kenville, N. J. From Kenville he was later transferred to Nitro, W. Va., where he remained until entering the University to take advanced courses in chemistry. Mr. Yoder, who also enlisted in the army early in the war, had the unique distinction of being a student in Sorbonne University, France, during the period given American soldiers in French universities. While at Sorbonne he became interested in chemistry and decided to pursue his courses further at Carolina.

New Dyes

T. M. ANDREWS

The following is an extract of an article appearing the *Atlanta Constitution* of May 17, 1918:

Dr. A. S. Wheeler, professor of organic chemistry at the University of North Carolina, has just announced the discovery of three new dyes of great promise. These dyes are of the naphthalene series and their discovery ranks as one of the most important contributions to our expanding dye industry. Four steps are necessary in the synthesis of these dyes and patents covering the processes have been applied for.

The first of these dyes is an indigo-blue substance which gives a champagne color on silk and a tan color on wool. Another is a rich maroon, giving a delicate purple on silk and a very beautiful color between orange and gold on wool. The third dye gives a very striking bronze tint. The shades are easily varied by the use of different mordants. In addition to the three dyes which have already been discovered, three more are already in sight of determination.

U. S. Patent Serial No. 165,988, entitled Improvements in Dyestuffs and processes for making same was allowed Dr.

Wheeler by the Patent Office October 16, 1919. This patent was applied for in December, 1918, and covers the preparation of three dyes, the discovery of which was announced in 1918.

Alumni Notes

I. V. GILES AND R. O. DEITZ

Dr. J. T. Dobbins, Ph. D. 1914, is assistant professor of chemistry in the University of North Carolina. From 1914-'18 he was a member of the faculty of A. and E. College at Raleigh. He is now beginning his second year with us, and is making a splendid success. The stork recently paid him a visit, leaving a daughter.

B. L. Meredith and Ralph Rimmer, both of '18, are research chemists with E. I. du Pont de Nemours Co. in the Jackson laboratory at Wilmington, Del. Experimental work on the development of dyes is done in this laboratory.

F. R. Blaylock, M. S. '17, is also in the Jackson laboratory as a research chemist, for the du Pont Co. He was transferred to the Jackson laboratory when the powder plant at Haskell, N. J., where he was formerly employed, was closed at the end of the war.

E. Nieman, A. B. '18, who spent most of his last three years in the chemistry building, is in the automobile business in Charlotte. He expects to be with us again after Christmas, however, to complete his requirements for the master's degree in chemistry.

J. P. and R. H. Sawyer, B. S. '18 and '19, respectively, have taken advantage of a business opportunity and are in the automobile business in Asheville. They have not entirely forsaken their chemistry and will doubtless go into this profession in the near future.

C. H. Herty, Jr., B. S. '18, and who was a student at the University in the spring of '19, is taking advanced work at the Massachusetts Institute of Technology.

George Byrd, Ph.C. '18, is with Zinser & Co., at Hastings-on-Hudson, N. Y. He is in the research department and reports much progress. This company manufactures dye intermediates and pharmaceutical drugs. Previous to his present employment,

George held a position for some time with the Hercules Powder Co. at Dover, Del.

V. C. Edwards, Ph.D., '14, is research chemist for E. I. du Pont de Nemours Co. in their eastern laboratory at Gibbstown, N. J. He has had a number of splendid promotions since going with this company.

O. A. Pickett, B. S. '16, is chemist in charge of the analytical and testing division of the experimental station of the Hercules Powder Co. at Dover, N. J.

V. A. Coulter, Ph. D. '16, returned from overseas during the summer and was discharged during the latter part of August. He was in chemical service and held the rank of captain. He made a flying trip to the Hill recently and reports that he is taking a rest before going back into chemical work.

L. D. Rawlings, '16, is in business at Wilson, N. C. He was married to Miss Margaret Kathryn Nowell, of Wilson, on October 16, 1919.

Among those who have sought their fortunes away from home is Dr. W. A. Whitaker. He is a very successful and well-liked professor of chemical engineering in the University of Kansas.

We wish a few more of our alumni would follow Dr. Stroud Jordan and write a few words of encouragement or warning for THE CAROLINA CHEMIST. Dr. Jordan seems to have taken the lead in several things for he is now research chemist for the American Tobacco Co.

Dr. J. J. Skinner is a very splendid chemist, and at present he is with the fertility division of the Bureau of Plant Industry of the U. S. Department of Agriculture. He was recently awarded the Edward Longstreth medal of merit by the Franklin Institute, Philadelphia, for his paper on "Soil Aldehydes."

Although Miss Daisy Allen has lost the distinction of being the only co-ed ever interested in chemistry, she need have no fears for the future since she has connected her name with that of a Carolina alumnus, Mr. L. L. Brinkley. Mr. Brinkley finished his chemistry here in '07 and we suppose that he is still with the State Soil Survey.

During the war Mr. M. L. Cox rendered valuable service to the Hercules Powder Co. as chief chemist of one of their branch laboratories. Since that time he has given up that position and entered the University of Chicago as a fellow. On his entrance his good work and pleasing personality won him recognition in further promotion.

We always expected great things of Richardson, but we hardly expected him to spend the winter teaching general science in the Wilmington High School. However, we hope that his plans may mature and that he may resume his work on juglone next year with Dr. Wheeler. This, however, is entirely uncertain, since it is rumored that he has added another element to his group and it is not Br.—it's a wife.

Vick Chemical Co., of Greensboro, has a valuable man in A. C. Cecil, who has worked faithfully for his degree as Ph.C.

Old friends of E. O. Cummings will be glad to learn that he is attending Massachusetts Institute of Technology as a candidate for a Ph. D. degree. His research is under Dr. James F. Norris, the author of our organic text-book. He is attempting to improve the method for preparing *paraphenylenediamine.*

From the latest reports, it seems that Joe Murray has a very promising position with the Emerson Drug Co., Baltimore. This is the company which manufactures Bromo-Seltzer.

We could only learn that H. G. Smith is at Atlanta with the Buckeye Cotton Oil Co. in analytical work.

The friends of Dr. J. E. Mills will not be surprised at the splendid recognition his splendid work with the chemical warfare service brought him.

So far as could be learned Dr. J. O. Graham is still at Cumberland University as professor of chemistry.

Although we regret that Mr. DeBerniere Whitaker could not find a home in this country, we are glad that he has accomplished so much in Santiago de Cuba as vice president and general manager of Juragua Iron Co. and Spanish-American Iron Co.

Mr. J. R. Harris has been very successful since his graduation in '89. He is now chief chemist of the T. C. H. R. R. Co. at Birmingham.

Mr. J. W. Turrentine, '02, has recently made a visit to the Hill to enlist the aid of Dr. Wheeler in the investigation of some complex oils resulting from the distillation of kelp. He has built for the Bureau of Soils a plant at Santa Barbara, Cal., for the production of potassium. His work has been very successful and he has produced many by-products of scientific and commercial interest.

Alumni Gathering at Philadelphia

I. V. Giles

Carolina was well represented at the fall convention of the American Chemical Society in Philadelphia. Among those present were: Doctors Venable, Wheeler, and Bell, of the faculty; Doctors Baskerville, Ph.D. '94, V. A. Coulter, Ph.D. '16, V. C. Edwards, Ph. D. '14, and Chas. Venable, '14; also F. R. Blaylock, M. S. '17, R. H. Rimmer, C. H. Herty, Jr., B. L. Meredith and I. V. Giles, '18, and D. M. Carroll, '20. Papers were presented by Dr. Baskerville, Dr. Wheeler, and C. H. Herty, Jr.

An informal "get together" luncheon was attended by Edwards, Herty, Coulter, Carroll, Giles, Meredith, and Rimmer, and was greatly enjoyed by all.

THE HIGH SCHOOL DEPARTMENT

As the Chemical Alumni grew in numbers and the Departmen of Chemistry developed in size and importance, there grew up a desire on the part of each to exchange greetings and to otherwise keep more closely in touch with each other as they became more widely separated in space. THE CAROLINA CHEMIST came into existence to satisfy this desire, and for over four years it has done its best to fulfill its mission—to keep alive

The Spirit of the Department

But there is a feeling of dissatisfaction with this narrow sphere of activity and this fall THE CHEMIST will invade a new field to demand a larger audience and a bigger opportunity for usefulness. Therefore, it turns to the High Schools and Preparatory Schools of North Carolina with a challenge to a contest of scholarship in chemistry. In order to stimulate a more active interest in the contest, a medal, known as "The Carolina Chemist Scholarship Medal," will be given to the student making the highest grade in the competetive examination which will be submitted by THE CHEMIST next spring. Its purpose is to make this contest an annual affair.

The purpose of this contest is to focus the attention of the young men and young women of North Carolina on chemistry as a science, and at the same time to invite them to a careful consideration of it as a profession.

In this new line of action, THE CHEMIST hopes to receive the spontaneous coöperation of all people interested in higher education in North Carolina, and particularly of those interested in chemistry. It feels confident of the support of all Carolina men, whether they are chemists or poets or both or neither, but it wishes to emphasize the fact that not one of them should leave it to any one else to boost the scholarship contest. Success depends on each man. It makes a special appeal to the school officials to give the contest all the publicity possible.

Rules Governing the Examination

1. Any high school or preparatory school will be eligible to compete, if its senior course in chemistry is not accepted by the University as the equivalent of general chemistry (1-2).

2. The contest is open to boys and girls alike.

3. In order to receive the medal the winner must be registered in the University at the opening of the fall term following the examination. In case the person making the highest grade fails to register, the medal will be presented to the next highest who has registered.

4. The questions will be prepared by the Head of the Department of Chemistry of the University.

5. Copies of the examination will be sent sealed to the superintendents of the competing schools. The superintendent will deliver them unopened on the day of the examination to the teacher in charge of the course in chemistry.

6. The examination will be held March 1, 1920.

7. The examination will last two hours.

8. Only one paper will be accepted from any one school. It shall be selected jointly by the superintendent and the teacher in charge of the chemistry course, and forwarded to THE CAROLINA CHEMIST, together with a signed statement that the examination was conducted in good faith throughout.

9. Papers noticeably deficient in English and spelling will not be considered.

10. Papers must be submitted in the handwriting of the contestants.

11. The paper showing the highest percentage will be awarded the medal.

12. The medal will be presented by the Head of the Department of Chemistry at the annual chemical feed at the Chemistry Building.

Departmental Organizations

H. M. TAYLOR

There are several organizations in the department, the purpose of which range all the way from merely social activity to serious study.

There is held annually a big "Chem. Feed" at which we all become acquainted, acquire the "Spirit of the Department," and enjoy the best eats that can be provided.

The Journal Club is a club composed of all chemical students. It meets fortnightly and the program consists of informal talks on general topics by the faculty, graduates, seniors, and juniors. Join in this and reap the benefits.

Alpha Chi Sigma is a national chemical fraternity. Its membership is taken from the chemical department and men become eligible in the spring of their sophomore year. Its purpose is to promote good fellowship and to aid its members in the pursuit of their profession. A chapter house is maintained. Its members are selected on a basis of their personality and scholarship.

The Elisha Mitchell Scientific Society is composed of graduates in all scientific branches. Topics of general scientific interest are discussed.

What is a Chemist?

DR. J. M. BELL

Just as there are still folks who consider that the subject of Physics has something to do with calomel, Epsom salts, and the like, so there are still folks who believe that the sole job of the chemist is to analyze things. It may be that this impression has deflected many a would-be chemist into some other calling, certainly being only an analyst is being only a piece of a chemist. Analysis is only one of the tools of a chemist, and a very powerful tool it is too,—but yet only a tool. It is not an easy task to give an adequate idea of all the other tools which a chemist should have in his tool-chest. Possibly a short statement about some of these would be of interest to young men and women

who have not yet decided on a calling and who have the scientific bent.

Like all other large fields chemistry has been subdivided into smaller fields. It is somewhat curious that the subject is usually classified according to two different systems. It has subdivisions according to the matter studied, as organic chemistry, inorganic chemistry, physiological chemistry, biological chemistry, mineralogical chemistry, etc. It is also divided according to the method of study, as analytical chemistry, physical chemistry, electrochemistry, etc. Besides these branches of the "pure science," there are numerous branches of industrial and applied chemistry, some of which are: foods, water and sewage, soils and fertilizers, glass and ceramics, building materials, fuels, paper, explosives, dyes and textiles, paints and varnishes, fats and soaps, sugar and starch, leather and glue, rubber, and hosts of other products.

It is not necessary to find excuses for the industrial chemist. The very existence of whole industries depends upon the scrupulous observance of proper conditions,—moisture, temperature, composition of mixtures or other conditions. The determination of what these conditions are and later the maintenance of these conditions in a factory become the job of the chemist. Frequently he must also look for new uses for his company's products or for uses of waste products. The utilization of waste products is often the deciding factor in the economic operation of a plant. It has been truly said that the great Chicago packing houses use up all of the hog except the squeal. These packing houses employ large staffs of chemists to control their factory operations and to see that nothing is wasted. An industrial chemist therefore may encounter very unexpected problems in his work and should have some familiarity with the use of the other tools for the solution of such problems. His training should be of the broadest kind and he should be a specialist in his own line of work. He should know something of everything chemical and everything of something.

The "pure scientist" sometimes requires an apology for his existence,—at least so it appears to the man-on-the-street. It it not difficult to persuade even the most backward of school boards of the usefulness of a man whose activity can be meas-

ured in dollars and cents. The other man whose product cannot be immediately valued in terms of money sometimes needs an apologist. This seems to have been the case long ago, for do we not read in holy writ: "And with all thy getting, get understanding." This proverb was no doubt called forth by the tendency of that age to employ only one standard of value,—money.

One of the functions of the "pure scientist" is to provide essential data which everybody uses and nobody pays for. By such means have our tables of atomic weights been made and large quantities of other necessary results have been contributed. The pure scientist also lays the foundations for future progress. The investigations of Faraday are the basis of a great part of electrochemistry and of electrical engineering. The work of Pasteur is the basis of the whole subject of bacteriology and of our modern treatment of disease. The modern theories upon which rests much of the advance of to-day have come from the pure scientist without hope of adequate financial reward. In fact, it would be impossible to estimate the debt of humanity to Faraday and Pasteur and hosts of others. Another of the tasks of the scientist is to see that the rising generation of scientists are thoroughly equipped for their work and fired with ambition to do something to add to the sum total of human knowledge.

It is therefore no sinecure to which THE CAROLINA CHEMIST invites the young people of North Carolina. It is a life which "scorns delights and lives laborious days," the results of the labor, however, providing the spiritual delight which comes from even a small contribution to human happiness.

The Champion Fiber Company

A. S. WHEELER

In Canton, N. C., about eighteen miles southwest of Asheville, are located the great mills of the Champion Fiber Company, one of the very important and highly interesting chemical industries of North Carolina. Though I spent a full day in this plant in the summer of 1918, I wished it were possible to remain longer. The mills are located on the Pigeon River, the

Turnpike Mountains rising up to the east and the Balsams to the west. The wood piles occupy a vast area in the immediate vicinity of the plant and are penetrated by a great network of sidetracks. This is the raw material for the production of pulp, container board, and tannic acid, which is exported to Japan, France, Italy, South America and other foreign countries. It consists of spruce, pine, poplar, balsam and chestnut. The daily consumption is 550 cords or 55 carloads. One thousand men are employed in the woods cutting this supply. To furnish power 500 tons of coal are consumed daily and this comes from the company's own coal mines in Tennessee where 300 miners are employed. While mentioning labor I may add that 1,000 men are employed in the plant at Canton, the payroll there alone amounting to $125,000.00 per month.

The general offices were first visited. In the basement, which is entirely above the ground, is a dining room in charge of a woman who is a trained dietitian. A free dinner is served daily except Sunday to the office force, superintendents and foremen of all departments of the plant. It was my pleasure to enjoy one of these dinners and its excellence can hardly be indicated by a statement of the menu which was: creamed fried chicken, mashed potato, corn, sliced tomato, bread sticks, bananas and cream, apples and grapes. This is only one of many things indicating a very progressive spirit on the part of the management. An especially interesting feature of the dinner was the postprandial conference which is held daily. After dinner cigars are lighted and for an hour or two a discussion is entered into of new propositions or some trouble which has arisen since the previous noon. These conferences are highly successful for many minds attack the problems from many angles.

The products of the plant are pulp, which is shipped in the form of sheets or bales to other parts of the country to be worked up into paper, container board, tannic acid extract and caustic soda. The pulp is made by the three usual processes, all in simultaneous operation: the sulphite, the soda and the sulphate processes. The sulphite mill produces 100 tons of pulp daily, the soda mill 85 tons and the sulphate mill 25 tons, the last being a comparatively recent addition. The sulphite mill

consumes 12 tons of sulphur daily. It was very interesting to see outside the mill a heap of sulphur containing one million pounds. There are three sulphite digesters, 54 feet high and 16 feet in diameter, and one slightly smaller. The soda mill consumes daily 55 tons of lime. There are seven soda digesters, 47 feet high and 9 feet 9 inches in diameter, and two somewhat smaller. After digestion the pulp is bleached, and the bleach for the purpose is manufactured at the plant. The bleach plant contains 396 electrolytic cells of the Wheeler type, producing 22 tons daily of 35 per cent chlorine bleach. Caustic soda is also manufactured, the output amounting to 7 tons of 76 per cent caustic. The bleach plant consumes 600 tons of salt and 250 tons of lime per month. I must confine myself largely to figures because any adequate description of processes and machinery would produce an extended essay, much too long for THE CAROLINA CHEMIST.

The extract plant is another highly important feature of this industry. Chestnut wood is extracted, producing 425 barrels daily of an extract containing 25 per cent tannic acid. This is a liquid obtained by a partial concentration in a vacuum. The extraction process requires only 11 minutes. During the war much of this liquid extract was carried down to dryness and the powder shipped to the British Government and it had priority over munitions in transportation.

Besides the pulp there are produced 18 tons daily of container board. Another important feature of the plant is the water purification system consisting of large filters and settling tanks. An excellent quality of water is required to produce a good pulp.

I wish to express here my thanks to Mr. E. P. Wood, a former student in our Department of Chemistry, and to his father, who entertained me and gave so freely of their time that I was able to inspect the entire plant.

Excerpts from the Freshman Scrap Book

H. M. Taylor

The kinetic theory of gases is the theory which enables the memory to retain a large variety of facts.

Copper oxide is just copper with one half of the hydrogen taken out.

When hydrogen is passed thru copper oxide at a high temperature the copper oxide acts as a catalyzer and produces water.

When hydrogen is mixed with copper oxide it will make ammonia.

Copper oxide plus hydrogen gives iron and water.

By a theory is meant a mental picture expressed in science.

It takes two persons to analyze water, a chemist and a . . . ??

Ozone differs from oxygen by water, acids and bases.

Water boils by the increase of heat or by the absence of coolness.

The heat of fusion is heat enough to absorb 8 grams of solid.

A mixture of gas and air will explode and cause electricity.

To liquify a gas you use a bent tube and put what chemicals will stand a certain pressure and when you let out the principles you will find the results.

The law of multiple proportions is expressed as follows: $2HCl \ \& \ 3H_2 = HClO_3$.

Molecular weight is the pressure of the molecules when they are bouncing around as in a toy balloon.

H_2O_2 cannot be distilled under 68 pressures.

Analysis is the separation of the properties of water.

Directory of the Graduates of the Department of Chemistry and a Few Who Made an Extensive Study of Chemistry While in the University

J. A. BENDER

The directory has been revised and brought up to date, and, so far as we have been able to determine, the addresses are correct. Any corrections would be appreciated by the editors.

Allen, W. M., '93.....526 N. Wilmington St., Raleigh, N. C.
Allen, R. T., M. S. '08.....A. E. F. France, via New York
First Lieut. 10th Engineers, Forestry
Andrews, T. M., M. S. '17.....Chapel Hill, N. C.
Student U. N. C.
Asbury, J. J., '00.....Home Address: Charlotte, N. C.
Baskerville, Chas., Ph. D., '94.....14th St. and Convent Ave., N. Y.
Head of the Dept. of Chemistry, College of the City of N. Y.
Battle, H. B., Ph. D. '87.....193 Court St., Montgomery, Ala.
Battle Laboratory
Belden, A. W., '97.....Woodlawn, Penn.
Supt. Coke Oven Dept., Jones and Laughlin Steel Co.
Bennett, H. H., '03.....Washington, D. C.
Bureau of Soils
Bohannon, E. F., '04.....806 Empire Bldg., Atlanta, Ga.
Bransford, Chas., '06.....Ensley, Ala.
Gulf States Steel Co.
Brinkley, L. L. '07.....Raleigh, N. C.
State Soil Survey
Bryan, P. R., '13.....Wilson and Mills Ave., Clairton, Pa.
Supt. Naphthalene Refining Co. of Carnegie Steel Co.
Burns, R. P., '07.....Home Address: Wadesboro, N. C.
Carter, C. B., Ph.D. '16.....Pittsburg, Pa.
Fellow in Mellon Institute
Catlett, G. F., '03.....Home Address: Wilmington, N. C.
Capt. in A. E. F.
Cauble, D. Z., '00.....1501 13th Ave., South Birmingham, Ala.
Salesman, Industrial Loan and Savings Co.
Clark, Thos., '06.....6363 St. Charles Ave., New Orleans, La.
Professor of Chemistry, Loyola University
Conroy, F. D., '14.....Home Address: Collowhee, N. C.
Coulter, V. A., Ph.D. '16.....Home Address: Newton, N. C.
Capt. in A. E. F.
Cowell, C. F., '12.....Washington, N. C.
Cox, H. M., '14.....Chicago, Ill.
Chem. Dept., Univ. of Chicago

Crooke, H. L., '17.....810 N. Adams St., Wilmington, Del.
Chemist, du Pont Co.
Cummings, E. O., '19.....28 River St., Cambridge, Mass.
Student, M. I. T.
Dancy, F. B., '81.....922 St. Paul St., Baltimore, Md.
Retired Chemist and Manufacturer
Daniels, V. C., '04.....Oriental, N. C.
Davis, R. O. E., Ph.D. '03.....Washington, D. C.
Bureau of Soils
Dobbins, J. T., Ph.D. '14.....Chapel Hill, N. C.
Associate Professor of Chemistry, U. N. C.
Edwards, V. C., Ph.D. '15.....205 Dartmouth Ave., Swarthmore, Pa.
Research Chemist, du Pont Co.
Farmer, J. L., '16.....Home Address: Wilson, N. C.
U. S. Nat. Army
Field, A. L., '11.....2403 Washington Boulevard, Chicago, Ill.
Flume, A. L., '14.....47 Lyceum St., Geneva, N. Y.
New York Experiment Station
Foust, T. B., '03.....Clarksville, Tenn.
Operating Clarksville Foundry and Machine Works
Giles, I. V., '18.....Chapel Hill, N. C.
Instructor in Chem. U. N. C.
Graham, J. O., A. M. '13.....Lebanon, Tenn.
Prof. of Chemistry, Cumberland University
Hall, R. B., '11.....Apt. 41, 3845 Mt. Pleasant St., Washington, D. C.
Lieut. Chem. Warfare Service
Hall, L. C., '16.....National City, Col.
Chemist Hercules Powder Co.
Hardison, R. B., '07.....Washington, D. C.
Bureau of Soils
Harrell, W. H.....3728 Walnut St., Philadelphia, Pa.
Med. Student, University of Pa.
Harris, J. R., '94.....1230 S. 17th St., Birmingham, Ala.
Chief Chemist T. C. I. and R. R. Co.
Hart, F. B., '13.....Raleigh, N. C.
Department of Agriculture
Haywood, W. G., '98.....Raleigh, N. C.
Fertilizer Chemist, Dept. of Agriculture
Heide, S. S., '04.....Box 327, Ensley, Ala.
Assistant Chief Chemist, T. C. I. and R. R. Co.
Henderson, J., '02.....Washington, N. C.
Major, Q. M. C.
Henderson, J. L., P. D. '15.....Burlington, N. C.
Manager of City Drug Co.
Henry, R., '06.....Richmond, Va.
Virginia-Carolina Chemical Co.

Heard, W. O., ...Lafayette Bldg., Philadelphia, Penn.
Herty, C. H., Jr., '18.....25 Lee St., Cambridge, Mass.
Student M. I. T.
Hill, Hubert, M. S., '08.....Morganton, W. Va.
Assistant Prof. of Chemistry, Univ. of Va.
Hoke, C. B., '13.....Kosmo, Utah
Holland, W. R., '03.....919 Monmouth St., Gloucester City, N. J.
Welsbach Co.
Horsfield, B. T., '17.....Nashville, Tenn.
Tennessee Chemical Co.
Houck, W. A., '09.....Statesville, N. C.
Hoyle, A. H., '06.....2112 Ave. H, Ensley, Ala.
Steam Engineer, T. C. I. and R. R. Co.
Hunter, R. L., '11.....Care of H. B. Hunter Co., Norfolk, Va.
Meteorologist Class, U. S. N. R. F.
Hunter, W. S., '07.....Ensley, Ala.
T. C. I. and R. R. Co.
Ingram, H. B., '16.....Baden, N. C.
Isely, R. B., '17.....
Irwin, J. P. '04.....Hopewell, Va.
Du Pont Co.
Johnston, G. A., '04.....Chapel Hill, N. C.
Farming
Jordon, S., Ph.D. '09.....544-560 Park Ave., Brooklyn, N. Y.
Research Chemist, American Tobacco Co.
Kelly, B. W.....Birmingham, Ala.
Kenan, W. R., Jr., '94.....433 Locust St., Lockport, N. Y.
Manufacturer, Railroad Executive, Director Public Utilities Co.
Killifer, D. H., '15.....Nashville, Tenn.
Chemist, Nashville, Chattanooga and St. Louis R. R.
King, R. N., '00.....Thomas, Ala.
Republic Iron and Steel Co.
Klugh, B. G., '01.....Home Address: Coronaco, S. C.
Kluttz, W. L., '99.....Sheffield, Ohio
General Manager, Sheffield Iron Corporation
Knight, B. H., M. S. '13.....Chemists Club Bldg., 50 E. 41st St., New York
Assistant to Analytical and Consulting Chemist
Leonard, G. F., '18.....31 Second Ave., Highland Park, New Brunswick, N. J.
Bacteriologist, C. R. Squibb & Sons
Lichtenthaler, R. A., '02.....Box 112, Kingston, R. I.
R. I. Agricultural Exp. Station
Lockhart, J. B., '04.....33½ Auburn Ave., Atlanta, Ga.
Lockhart Laboratories
McRae, D., '09.....Pittsburg, Pa.
Research Chemist, with Westinghouse Electric & Mfg. Co.

Manning, I. H.....Chapel Hill, N. C.
Dean of the School of Medicine, U. N. C.
Marriott, W. M.....St. Louis, Mo.
Prof. in Wash. Univ. Med. School
Meredith, B. L., '18.....Box 887, Wilmington, Del.
Merritt, O. K., '17.....
Miller, C. L., '00.....Home Address: Shelby, N. C.
Miller, F. W., '98.....Holt, Ala.
Ala. Coal, Iron & Coke Co.
Mills, J. E., Ph.D. '01.....Columbia, S. C.
Prof. of Chemistry, U. S. C.
Moses, A. F., '97.....Winston-Salem, N. C.
Moss, E. G., '02.....Oxford, N. C.
Murray, J. S., '19.....Baltimore, Md.
Emerson Drug Co.
Marsh, L. G., '17.....4740 Friendship Ave., Pittsburg, Pa.
Physical Chemist
Nash, T. P., '10.....E. Liberty St., New York, N. Y.
Cornell Med. School.
Neiman, E., '18.....Charlotte, N. C.
Oldham, W. H., '05.....Ensley, Ala.
T. C. I. and R. R. Co.
Perry, R. W., '05.....Care of Gunn's Ltd., West Toronto, Ontario, Canada
Technical Supt. Gunn's Ltd.
Pickett, O. A., '16.....76 Morris St., Dover, N. J.
Chemist, Hercules Powder Co.
Pogue, J. E., M. S., '07.....University Club, Evanstown, Ill.
Geologist, Northwestern University
Prior, W. S., '02.....Ensley, Ala.
Pritchard, W. N., Jr., '15.....Augusta, Ga.
Buckeye Cotton Oil Co.
Rimmer, R. H., '18.....Box 887, Wilmington, Del.
Chemist du Pont Co.
Reasoner, N. A., '17.....
Rhodes, L. B., '13.....Raleigh, N. C.
Dept. of Agriculture
Roberts, J. C., '84.....Golden, Col.
Prof. in Col. School of Mines
Root, A. S., '01.....Raleigh, N. C.
Rudisill, W. A., M. S. '14.....Guilford College, N. C.
Prof. of Chemistry, Guilford College
Sawyer, R. H., 19.....Asheville, N. C.
Sawyer, J. P., '18.....Asheville, N. C.
Sifford, E., '05.....Eldorado, N. C.
Manager of Rich-Cog Mining Co.

Skinner, J. J., '03.....7217 Blair Road, N. W., Washington, D. C.
Biochemist, U. S. Dept. of Agriculture
Sloan, C. H., '06.....Home Address: Belmont, N. C.
Smith, H. G., '19.....Atlanta, Ga.
Analytical Chemist, Buckeye Cotton Oil Co.
Smith, W. A., '09.....Home Address: Norwood, N. C.
Sparger, R. W., '17.....Mt. Airy, N. C.
Stacy, L. E., M. A. '09.....North Wilkesboro, N C.
Chemist, Smoot Tanning Co.
Stem, F. B., '07.....Guantanamo, Cuba
Chemist, Guantanamo Sugar Co.
Stevenson, R., '02.....New York City
Prof. in Chemistry, College City of New York
Strowd, W. H., '09.....Madison, Wis.
Head of feed and fertilizer control for the State
Struthers, J. A., '14.....15 Hoogland, Dover, N. J.
Chemist, Hercules Powder Co.
Thorpe, J. B., '03.....Box 614, Gary, Ind.
Illinois Steel Co.
Thorpe, L. S., '17.....
Townsend, J., '13.....Boston, Mass.
A. D. Little Laboratories
Turrentine, J. W., '01.....Santa Barbara, Cal.
In charge of Kelp Plant
Venable, C. S., '10.....25 Lee St., Cambridge, Mass.
Technical Associate Professor M. I. T.
Weaver, F. R., '13.....Watertown, N. Y.
Captain, Ordnance, U. S. A.
Miller, N. R.....Brooklyn, N. Y.
Vice Pres. Garrett & Co.
Whitaker, DeB., '93.....Box 383, Santiago de Cuba
Manager of Juragua Iron Co. and Spanish-American Iron Co.
Whitaker, W. A., '04.....Lawrence, Kansas
Prof. of Chemistry, Univ. of Kansas
Wilkes, J. F., '83.....149 W. Morehead St., Charlotte, N. C.
Manager Mecklenburg Iron Works
Willard, C. W., '11.....Winston-Salem, N. C.

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